QUARTET

INTRODUCTION

The ARP Quartet is a compact, preset/variable synthesizer with four selectable voices—polyphonic brass, string, organ and piano. While the voices alone are realistic, combination of voices simultaneously chosen do not always maintain their individuality. The new sounds which appear add greatly to the flexibility of the Quartet.

Most of the circuitry in the Quartet is fairly simple. For that reason, the circuit descriptions have been kept succinct, dwelling only on areas that may prove new or confusing.

SCHEMATIC TERMINOLOGY

In the Quartet schematics, a Boolean mnemonic code is employed to identify logic control lines running between circuit boards. For example, where a Brass voice control line was identified, it was represented as mnemonic [B⟩ . Everywhere a mnemonic [B⟩ is shown it indicates a physical connection to all the other identical symbols. A connection is indicated only if the contents are identical in the different flags. That is, the symbol [B⟩ is NOT connected to the symbol [B · TR⟩ .

In addition, the flags give an indication of the expected logic levels that will appear on that line. On the line bearing this flag, [$\overline{\text{SO} \cdot \text{S}}$⟩ , a logic 0 will appear whenever String voice AND Solo have been selected. (A plus sign indicates an OR function. An elevated decimal indicates an AND function.) Even the complex flag [VB · (B+SO · S)⟩ translates to "A Logic 1 will appear when the Vibrato switch and either Brass or the combination of the Solo and String switches are closed."

Using the Boolean mnemonic code makes it possible to follow control lines through the combinational logic to see how they are "assembled" for different voices. Let's take the example where, by design, the vibrato circuit is enabled when Brass or Solo Strings is selected.

The flag for Solo Strings is [SO · S⟩ , indicating a Logic 1 will appear if both String voice AND Solo switch have been selected.

The flag for Brass is [B⟩ .

With the use of an OR gate, a new flag is created, [B + SO · S⟩ , indicating a Logic 1 will appear if Brass is selected OR String voice AND Solo switch are both selected. This new line is used to enable the vibrato circuit.

MNEMONIC CODE TABLE

Push Switches

Piano=P
Brass=B
Strings=S
Organ=O

Tab Switches

Trombone=TB
Trumpet=TR
Cello=C
Violin=V
Percussion=PZ
Solo=SO
Organ=OR
Celeste=CS
Piano=PI
Honky Tonk=H
Vibrato=VB

NOTE: Flags shown on the schematics are present when only one push switch is selected at a time. Troubleshooting should be done on one voice at a time.

The connector numbers also help in tracing paths through the Quartet. Connections are shown in this format:

P11–4C

connector number—pin number—destination board

P11-4 will be connected to J11-4 on Board C.

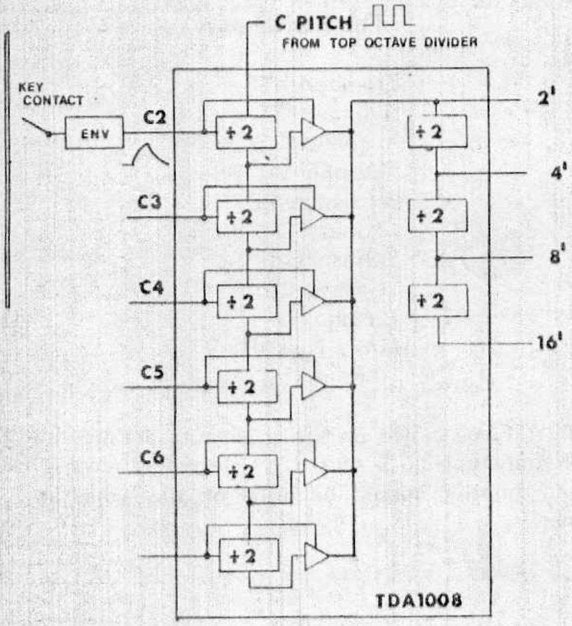
For those who are unfamiliar with European schematics, grounds are shown as a connection to a single horizontal bar. A 5.6K resistor will be written as 5K6. Some capacitors are listed in NANOfarads. An 4n7 capacitor translates to a .0047 microfarad capacitor.

CIRCUIT DESCRIPTION

Board C

The ARP Quartet uses a master oscillator and top octave divider to generate the pitches for the 49 note keyboard. Located on Board C, the master oscillator sends a 2001MHz signal to an MK50242 divider. This generates the twelve pitches of the highest octave, which are routed to their respective TDA1008 programmable gated dividers, one for each note of the octave. Depending on the gate selected by the key contact, different levels of division (octaves) are

selected and sent to another set of internal dividers to be converted to separate 2', 4', 8', and 16' pitches of that note. In addition, the keying envelope is used to control the voltage level of the signals being fed to the final divider stage. This results in a very flexible keyboard gating system for convincing polyphonic voices. The 2', 8', and 16' pitches leave Board C and are sent to Board F.



Board F

On Board F, ICf3 is a two pole VCF for the Brass voices. The String voices are sent to the three delay lines. Signals are shifted and clocked through the TDA1022 "bucket brigades" by their respective low and high frequency oscillators. Honky Tonk and Celeste voices are also routed to the delay lines but one delay line is disabled for these voices by the flag at J10-4B.

The strings squelch circuit shuts off the string signal when the input level to the delay lines is low enough to cause noise problems.

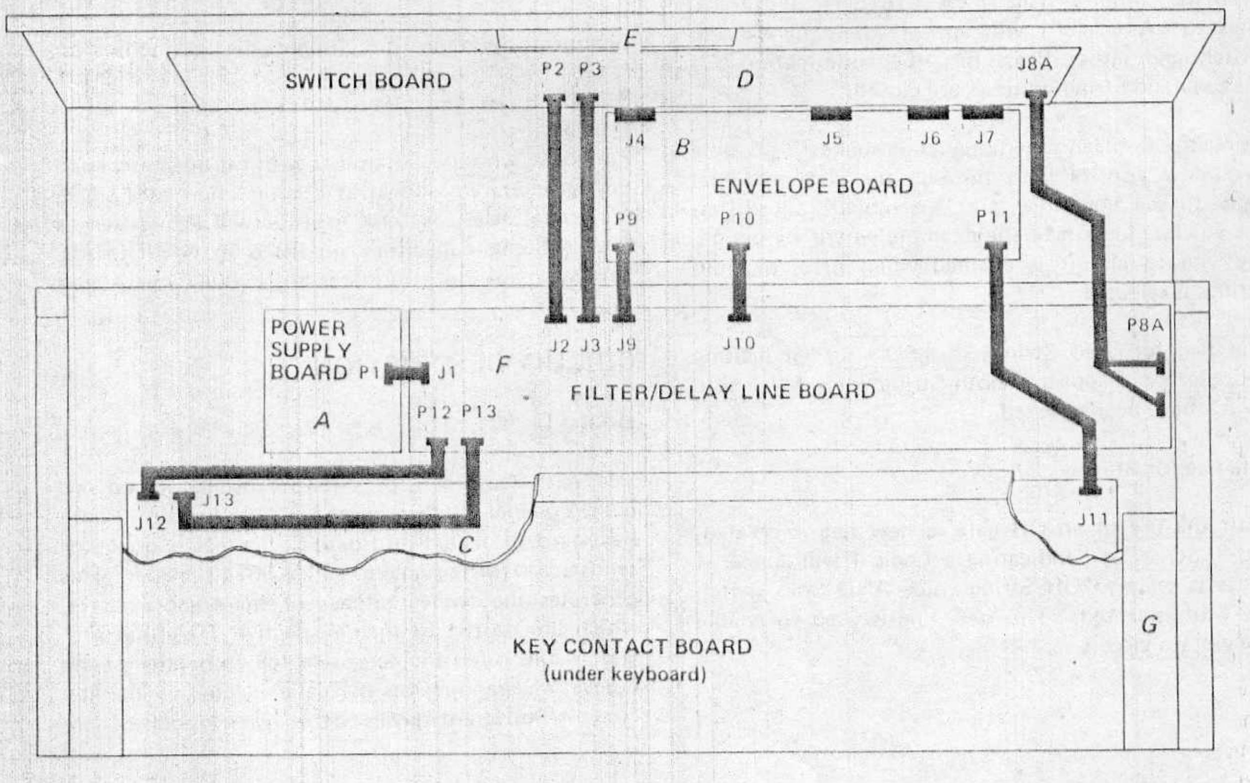
All the signals are sent to the Mix Preamp and then to the Output Stage (Tf10).

Board B

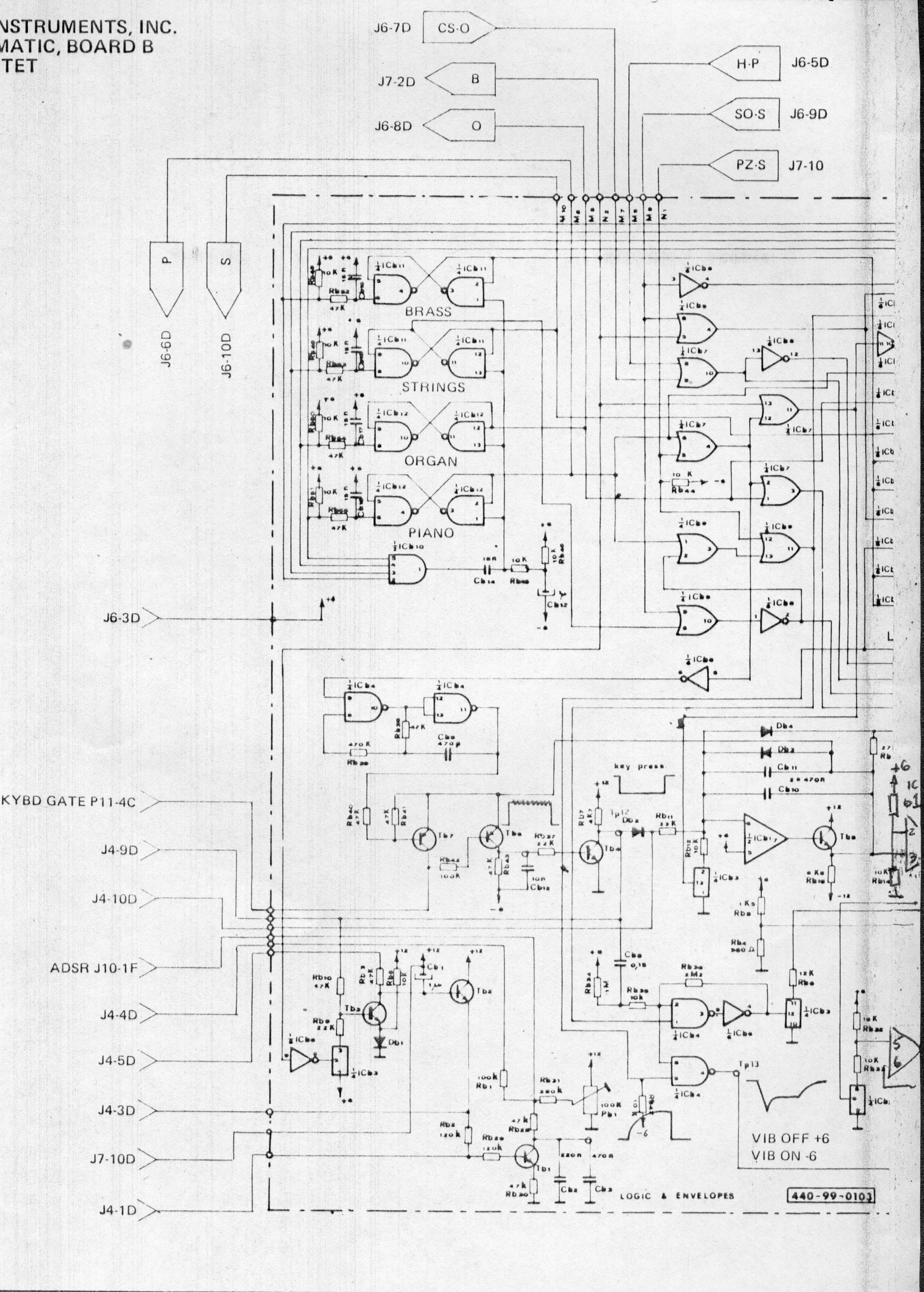
Logic levels to control channeling of the signals to the proper circuits, along with envelopes to control the Brass VCF and the delayed vibrato, and the Keyboard Gate signal for the keyboard buss rod are all generated on Board B.

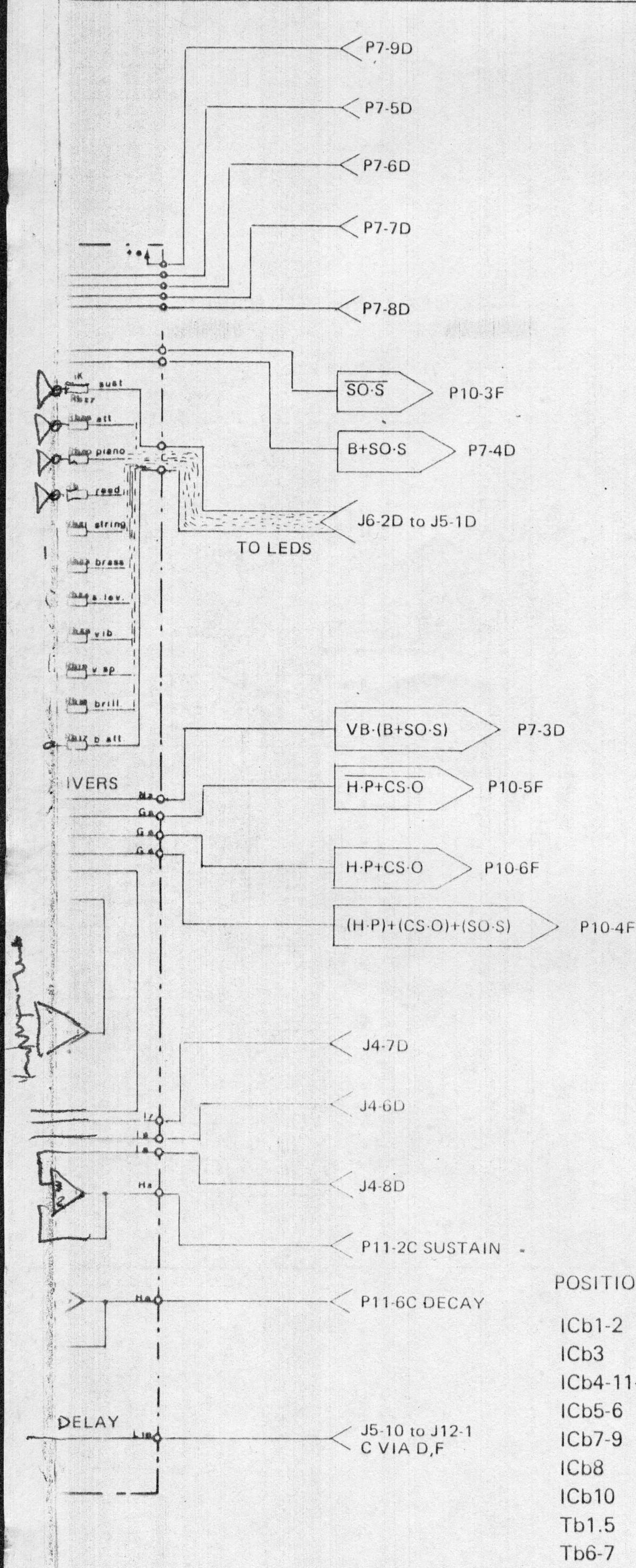
Boards A, D, E

The Power Supply (Board A) and the Controls Switch Board (Boards D and E) are self explanatory.



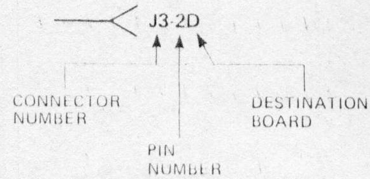
ARP INSTRUMENTS, INC.
SCHEMATIC, BOARD B
QUARTET



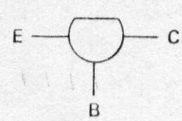


NOTES:

- All diodes are 1N 4148;
- All the logic signals are: O = −6V; 1 = +6V;
- All switches shown in off position;
- All resistors 1/4W unless otherwise indicated
- All electrolytic capacitors 16 V DC unless otherwise indicated.

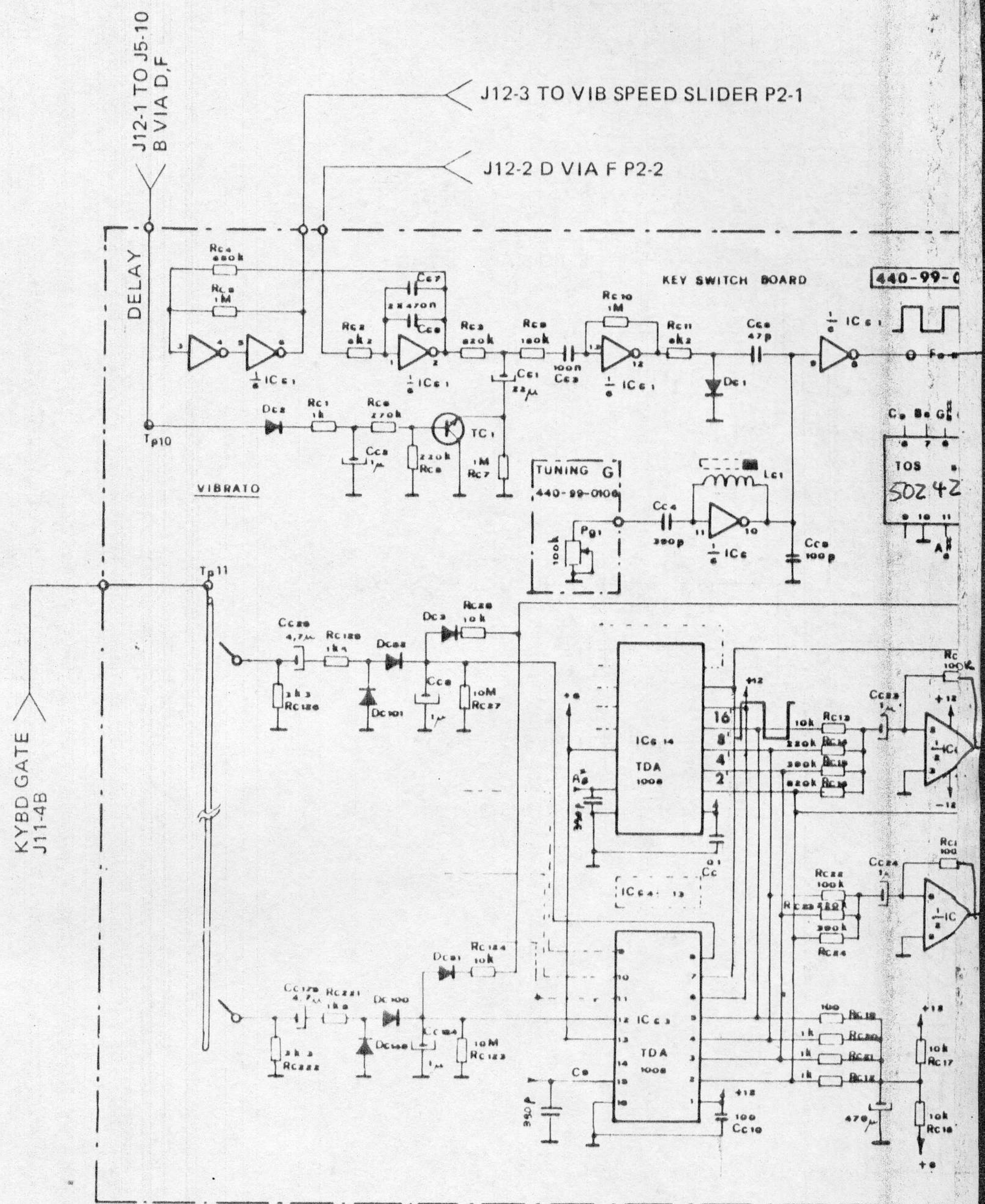


TOP VIEW
ALL TRANSISTORS



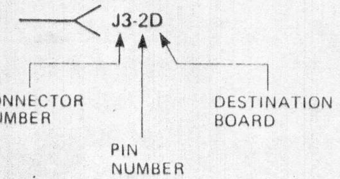
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ICb1-2	1458	367.99.7004
ICb3	4016	367.99.6004
ICb4-11-12	4011	367.99.6002
ICb5-6	4049	367.99.6012
ICb7-9	4071	367.99.6022
ICb8	4069	367.99.6005
ICb10	4082	367.99.6023
Tb1.5	BC 173	364.99.0003
Tb6-7	BC 416	364.99.0004

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SCHEMATIC, BOARD C
QUARTET

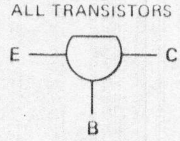


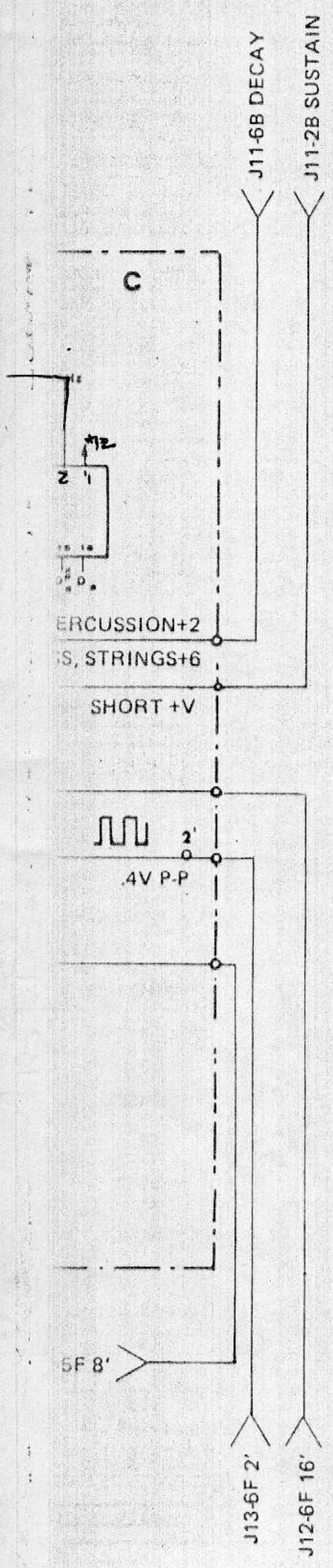
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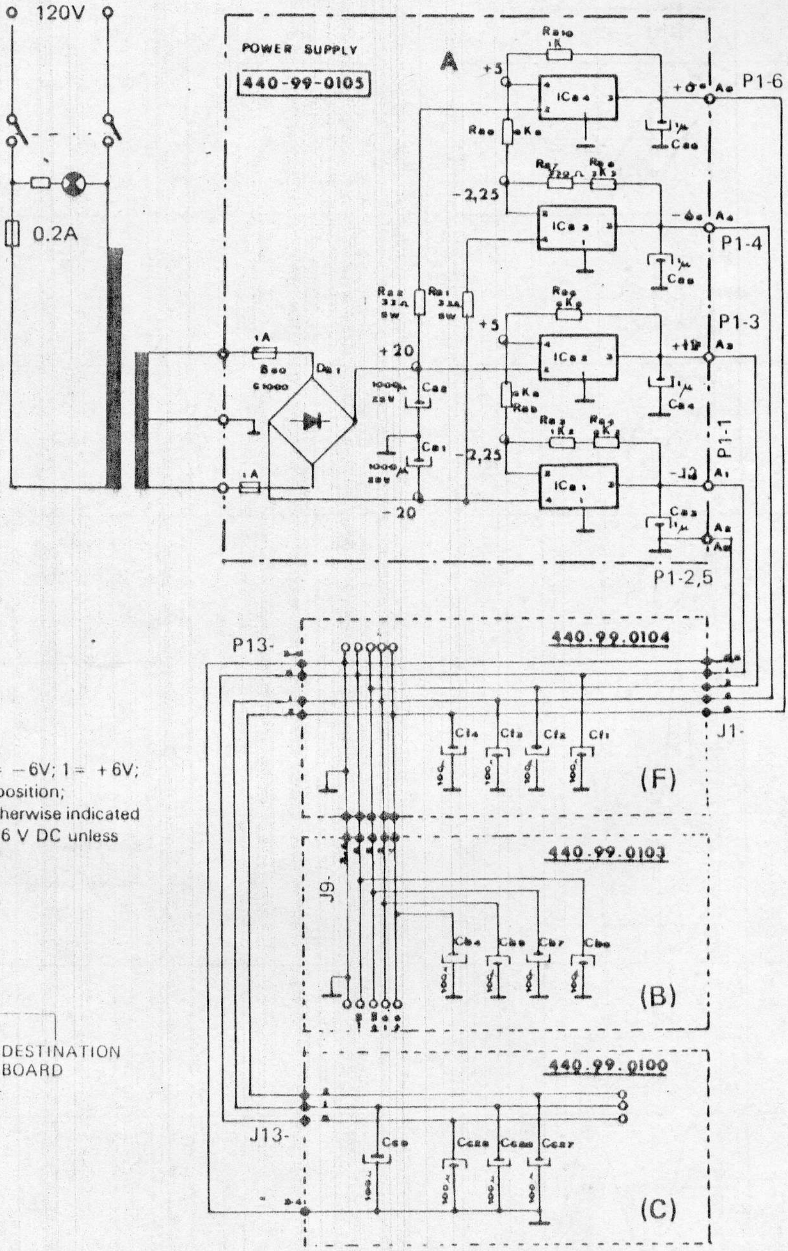
TOP VIEW
ALL TRANSISTORS

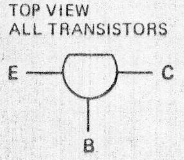




POSITION	TYPE	ARP PART NO.
ICc1	4069	367.99.6005
ICc2	50242	367.99.5001
ICc3 ÷ 14	TDA 1008	367.99.5011
ICc15	1458	367.99.7004
Tc1	BC173 selected	364.99.0007

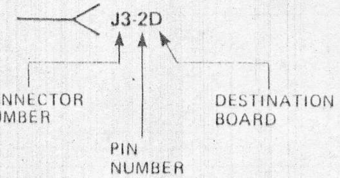
ARP INSTRUMENTS, INC.
SCHEMATIC, BOARD A
QUARTET





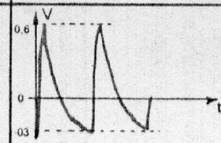
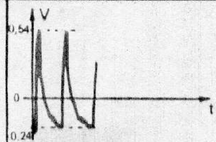
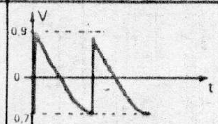
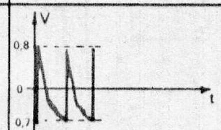
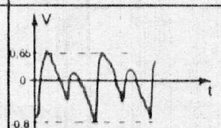
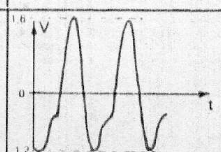
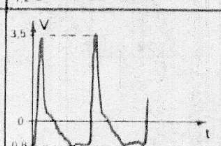
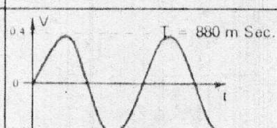
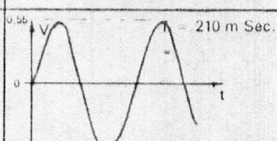
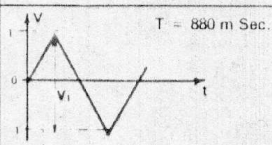
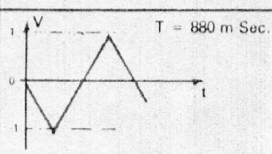
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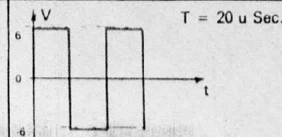
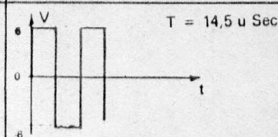
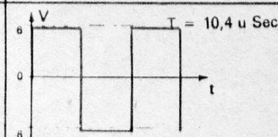
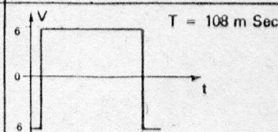
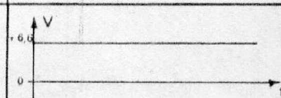
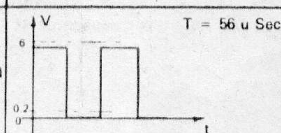
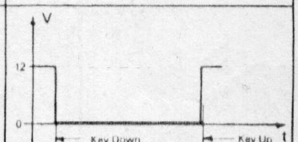
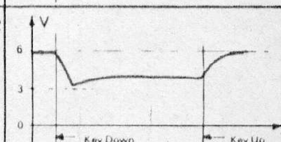
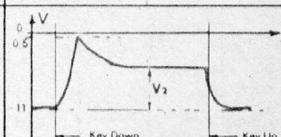
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- All electrolytic capacitors 16 V DC unless otherwise indicated.



POSITION	TYPE	ARP PART NO.
ICa1-3	uA 79 MG	367.99.8003
ICa2-4	uA 78 MG	367.99.8002

TEST POINTS

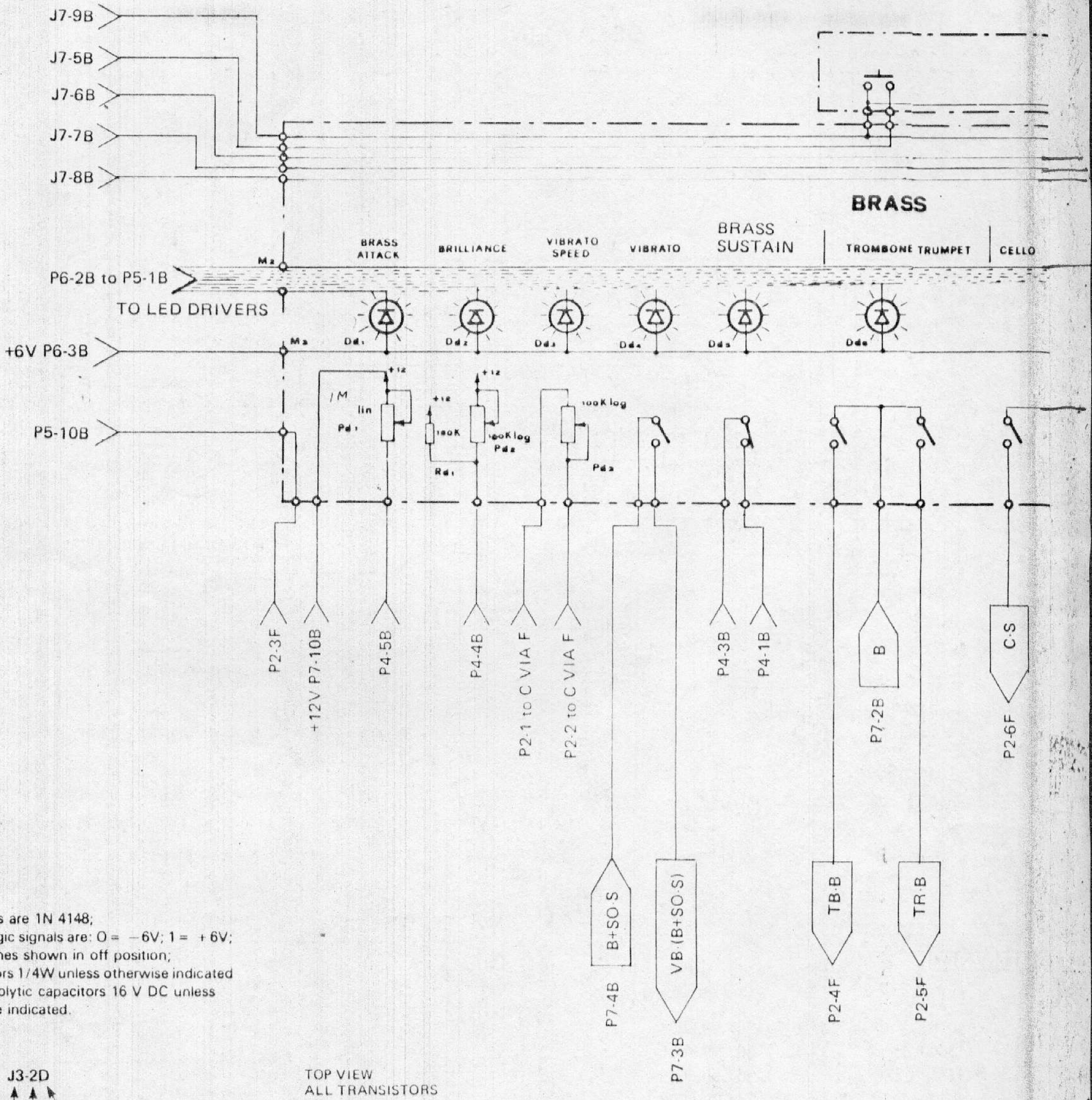
TP	INSTRUMENT INSERTED	CONDITION	WAVEFORMS
01	Trombone	– Brilliance max – Mute off - f = 440 Hz	
01	Trumpet	Brilliance max Mute off - f = 880 Hz	
X1	Cello	- Percuss. off - f = 440 Hz	
X1	Violin	Percuss. off f = 880 Hz	
01	ORGAN	Attack min. f = 880 Hz	
X1	CELESTE	Attack min. f = 880 Hz	
01	Piano	Sustain max f = 440 Hz	
X1	Honky Tonk	Sustain max f = 440 Hz	
Tp1	Violin or Cello		
Tp2	Violin or Cello		
Tp1	Honky Tonk or CELESTE		
Tp2	Honky Tonk or CELESTE		

TP	INSTRUMENT INSERTED	CONDITION	WAVEFORMS
Tp3			
Tp4		Tp1 To ground	
Tp5		Tp2 To ground	
Tp6		Tp3 To ground	
Tp7 Tp8 Tp9	Violin	Perc off Solo off f = 440 Hz	
Tp10	Trumpet	- Vibrato on - Any Key pressed	
Tp11	Piano		
Tp11	Violin	– Attack min – Any key, pressed	
Tp12	Trumpet		
Tp13	Trumpet	– Brass Attack 1/2 – Brilliance max – Mute off	
Tp14	Trumpet	- Brass Attack 1/2 - Brilliance max - Mute off	

ADJUST

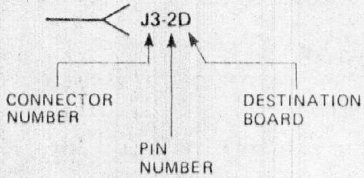
Tp1	CELESTE		Adjust Pf1 for V_1 = 2 Vpp
Tp14	Trumpet		Adjust Pb1 for V_2 = -7V
Fo	Set ext Tuning 1/2		Pitch the coil Lc1 for fo = 2,001 MHz

ARP INSTRUMENTS, INC.
SCHEMATICS, BOARDS D & E
QUARTET

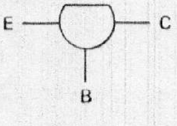


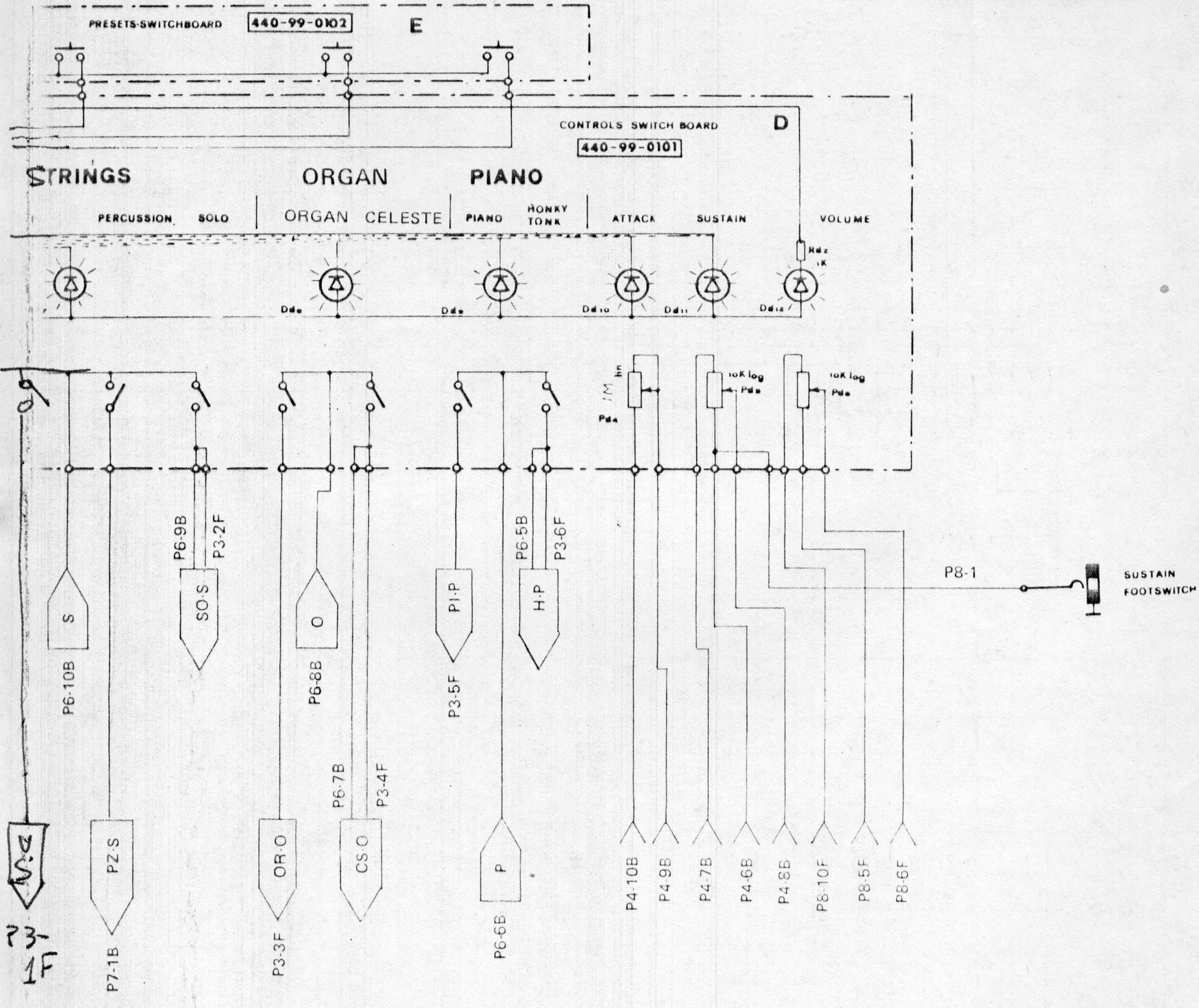
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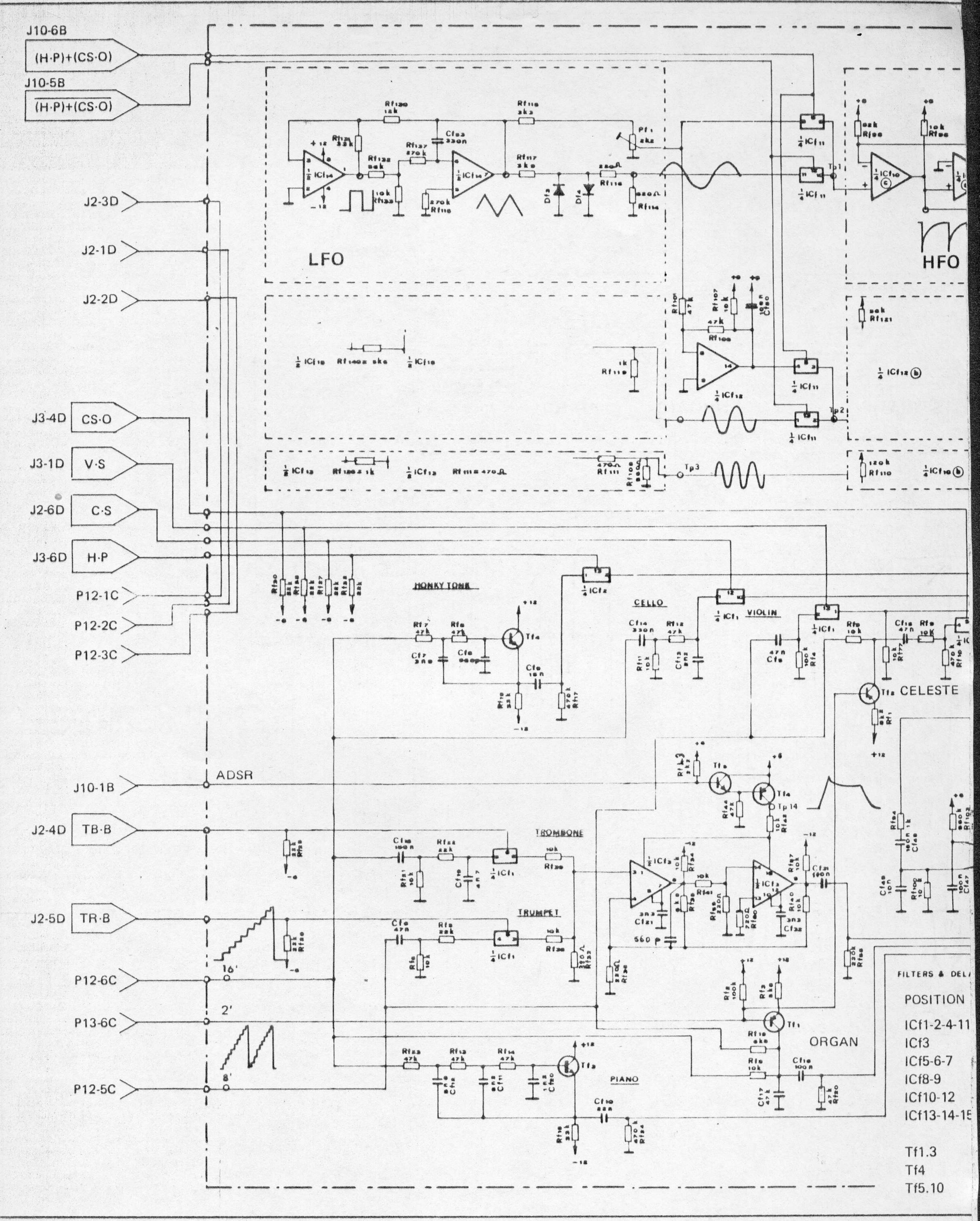
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- All electrolytic capacitors 16 V DC unless otherwise indicated.



TOP VIEW
ALL TRANSISTORS



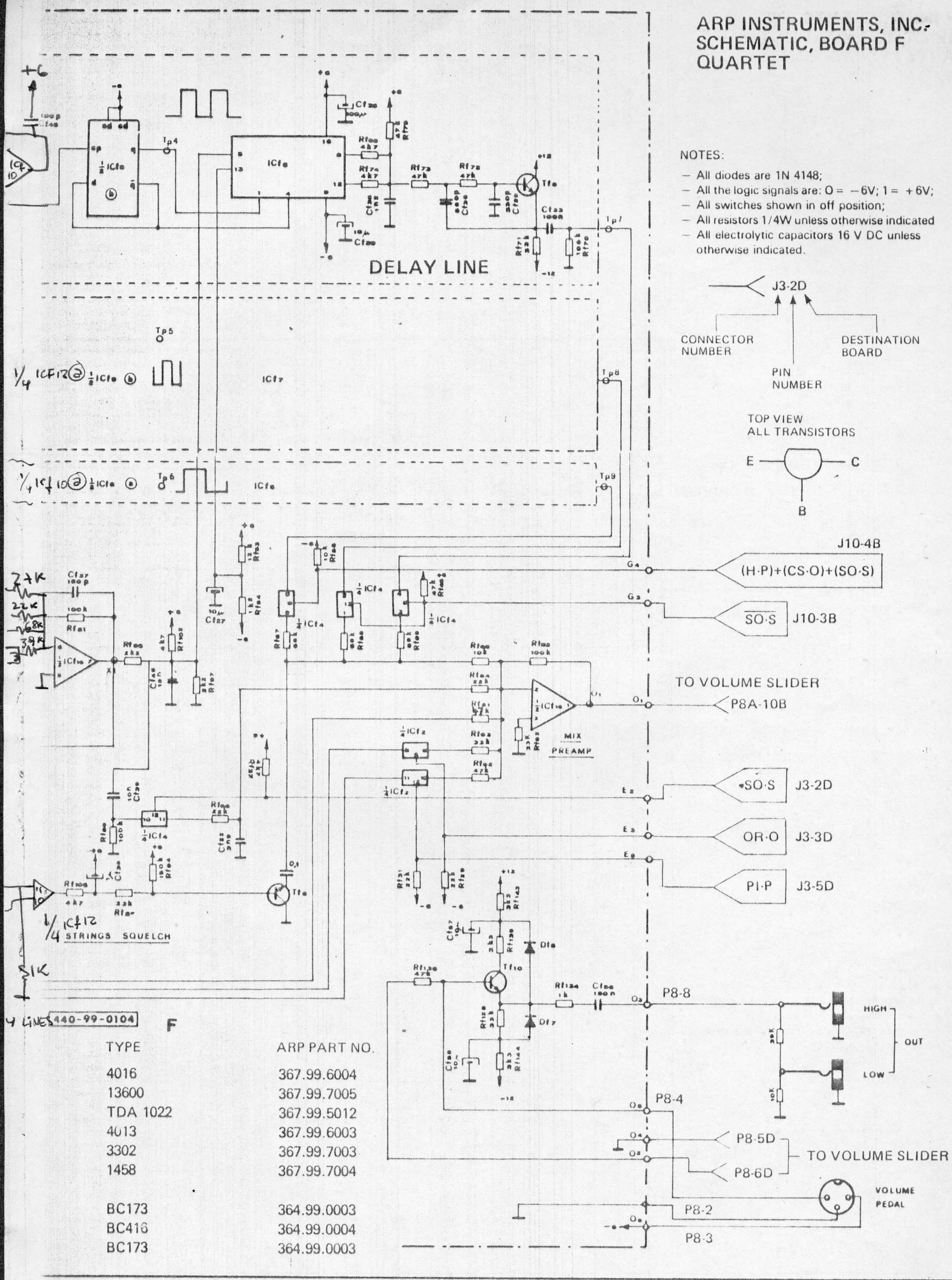

PRESETS-SWITCHBOARD
440-99-0102
E
CONTROLS SWITCH BOARD
440-99-0101
D
STRINGS
ORGAN
PIANO
PERCUSSION
SOLO
ORGAN
CELESTE
PIANO
HONKY TONK
ATTACK
SUSTAIN
VOLUME
10K log
10K log
P8-1
SUSTAIN FOOTSWITCH
S
P6-10B
SO-S
P6-9B
P3-2F
PZ-S
P7-1B
OR-O
P3-3F
O
P6-8B
CS-O
P6-7B
P3-4F
PI-P
P3-5F
H-P
P6-5B
P3-6F
P
P6-6B
P4-10B
P4-9B
P4-7B
P4-6B
P4-8B
P8-10F
P8-5F
P8-6F
P3-1F


J10-6B
(H·P)+(CS·O)
J10-5B
(H·P)+(CS·O)
J2-3D
J2-1D
J2-2D
J3-4D
CS·O
J3-1D
V·S
J2-6D
C·S
J3-6D
H·P
P12-1C
P12-2C
P12-3C
J10-1B
ADSR
J2-4D
TB·B
J2-5D
TR·B
P12-6C
16'
P13-6C
2'
P12-5C
8'
LFO
HFO
HONKY TONK
CELLO
VIOLIN
CELESTE
TROMBONE
TRUMPET
PIANO
ORGAN
FILTERS & DEL
POSITION
ICf1-2-4-11
ICf3
ICf5-6-7
ICf8-9
ICf10-12
ICf13-14-15
Tf1.3
Tf4
Tf5.10

ARP INSTRUMENTS, INC.
SCHEMATIC, BOARD F
QUARTET

NOTES:

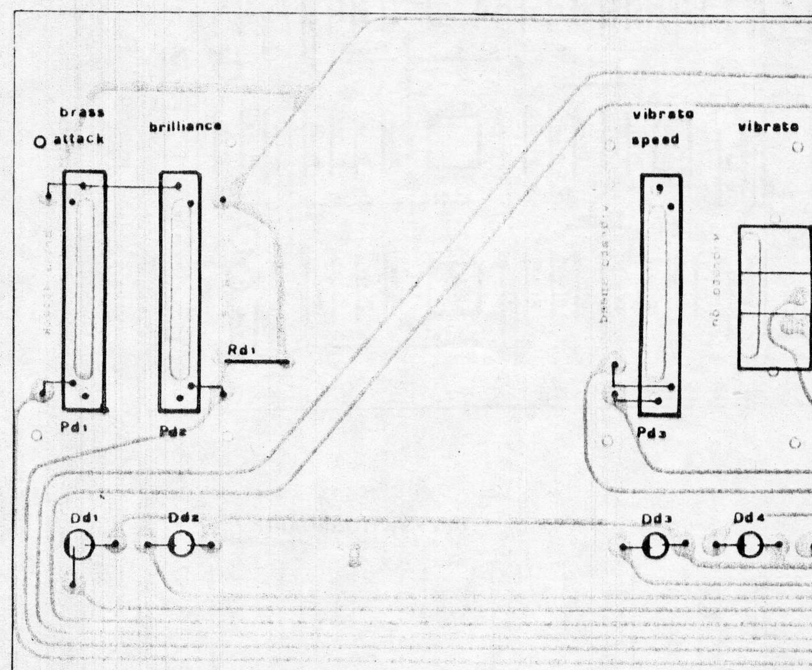
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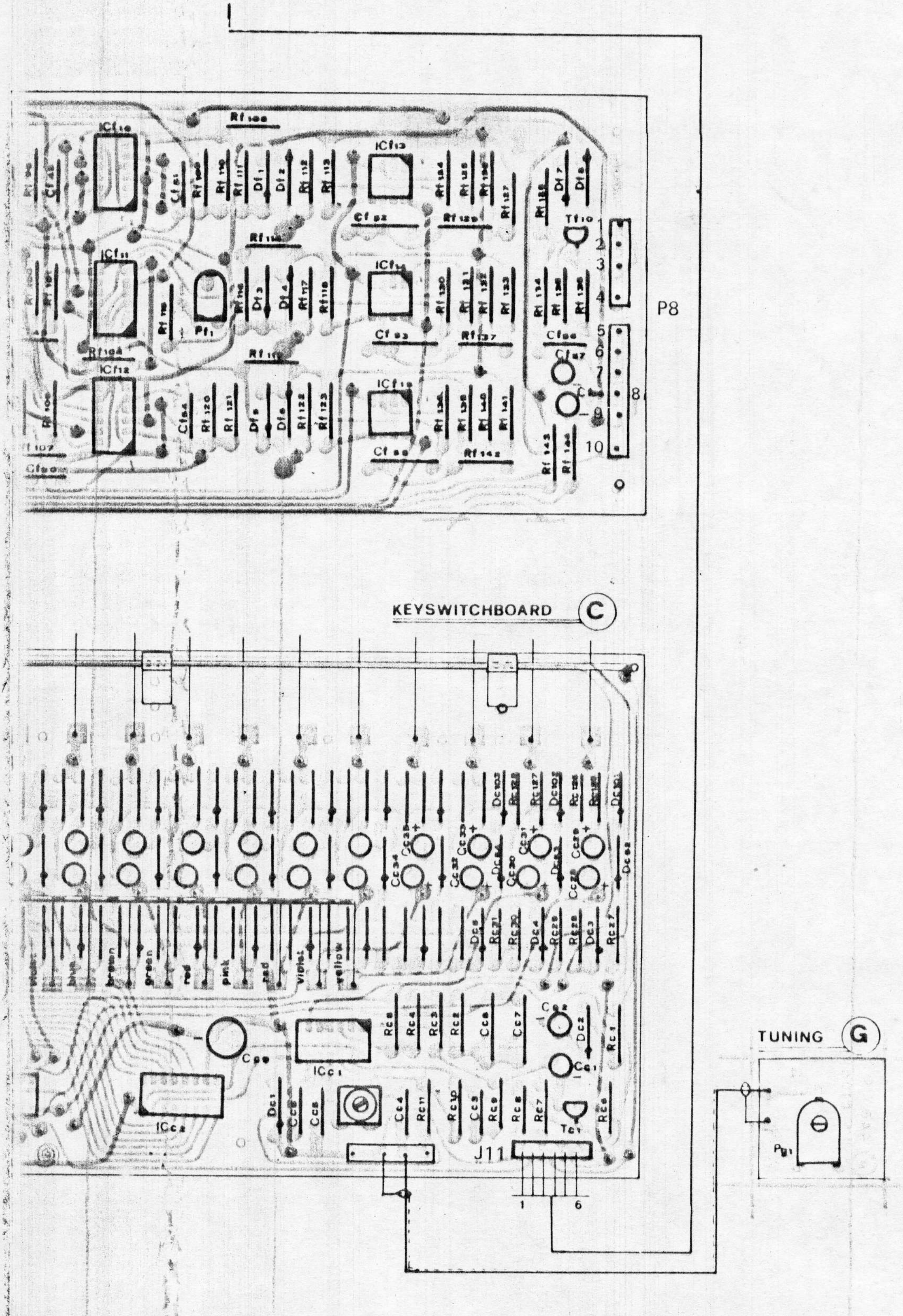


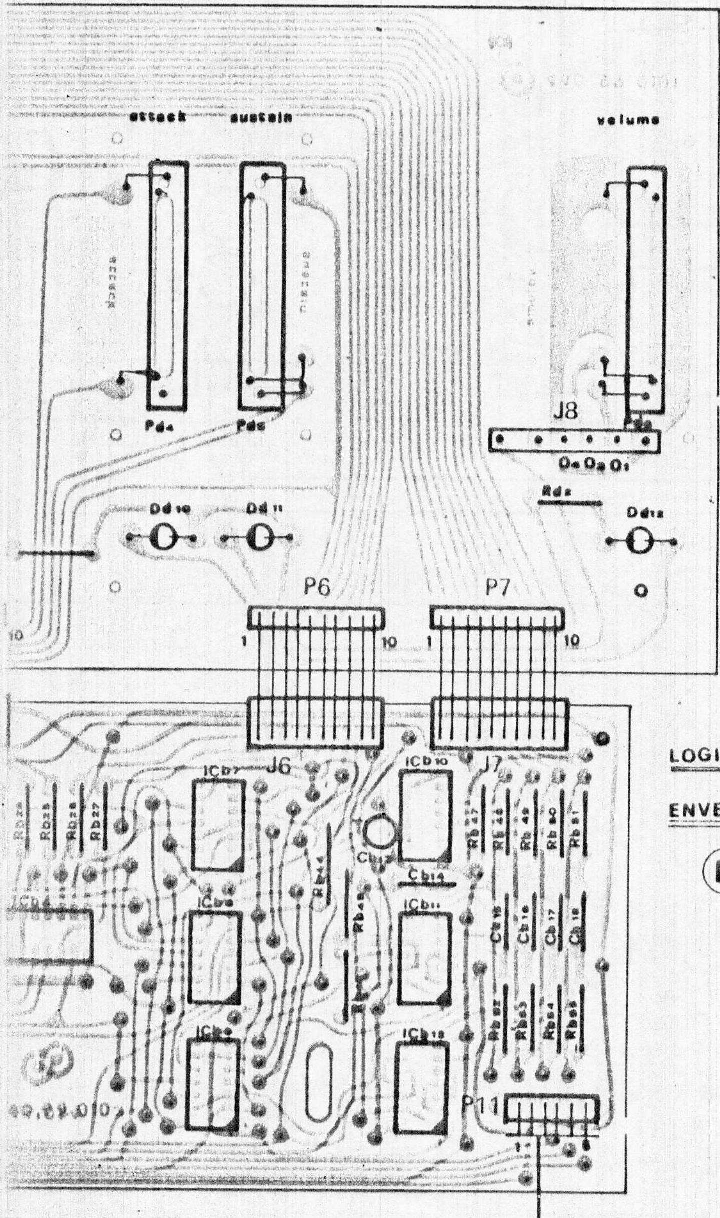
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13600	367.99.7005
TDA 1022	367.99.5012
4013	367.99.6003
3302	367.99.7003
1458	367.99.7004
BC173	364.99.0003
BC416	364.99.0004
BC173	364.99.0003

ARP INSTRUMENTS, INC.
ASSEMBLY, BOARDS B, D, & E
QUARTET

CONTROLS SWITCHBOARD (D)




P8
KEYSWITCHBOARD
C
TUNING
G
J11
1
6

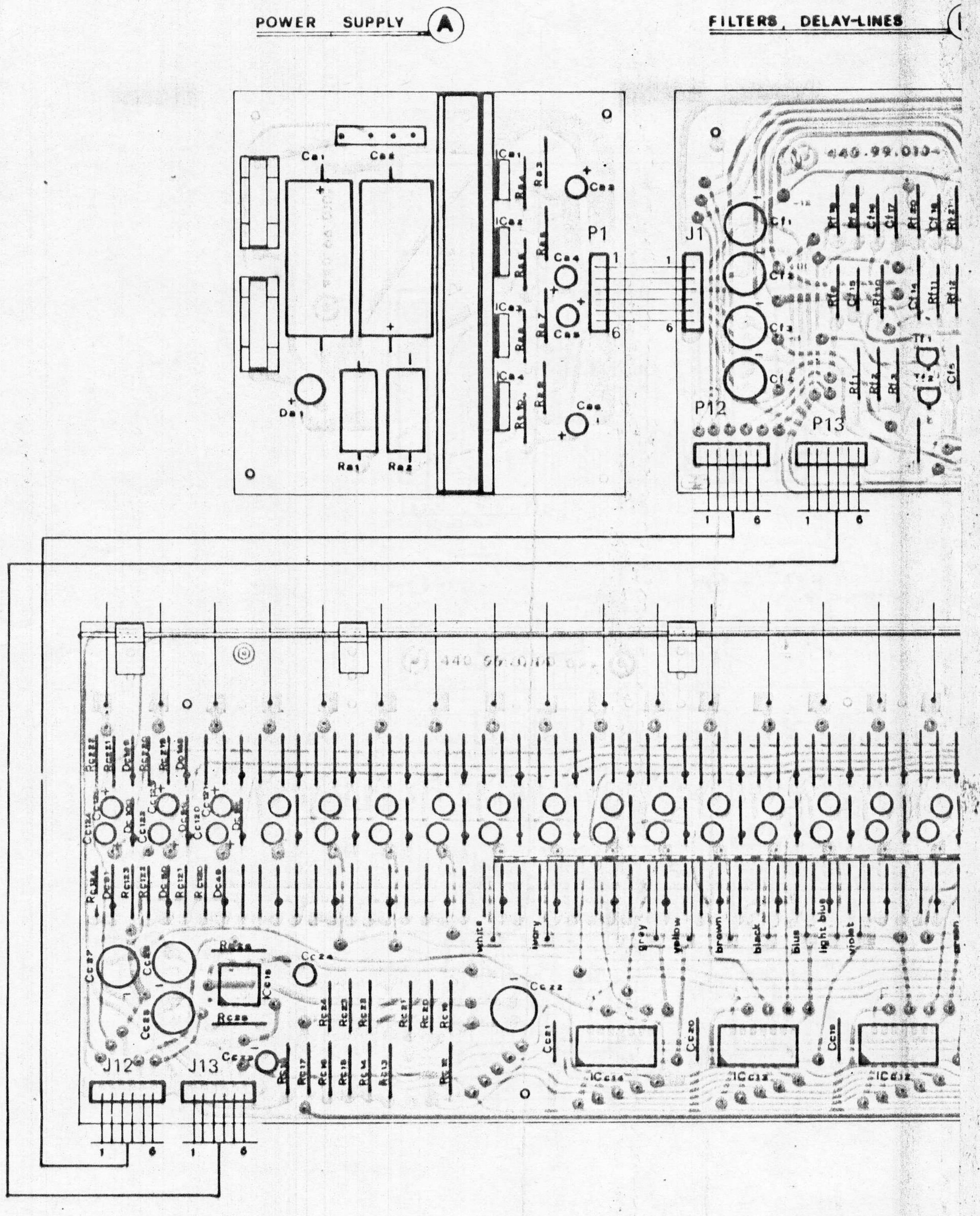


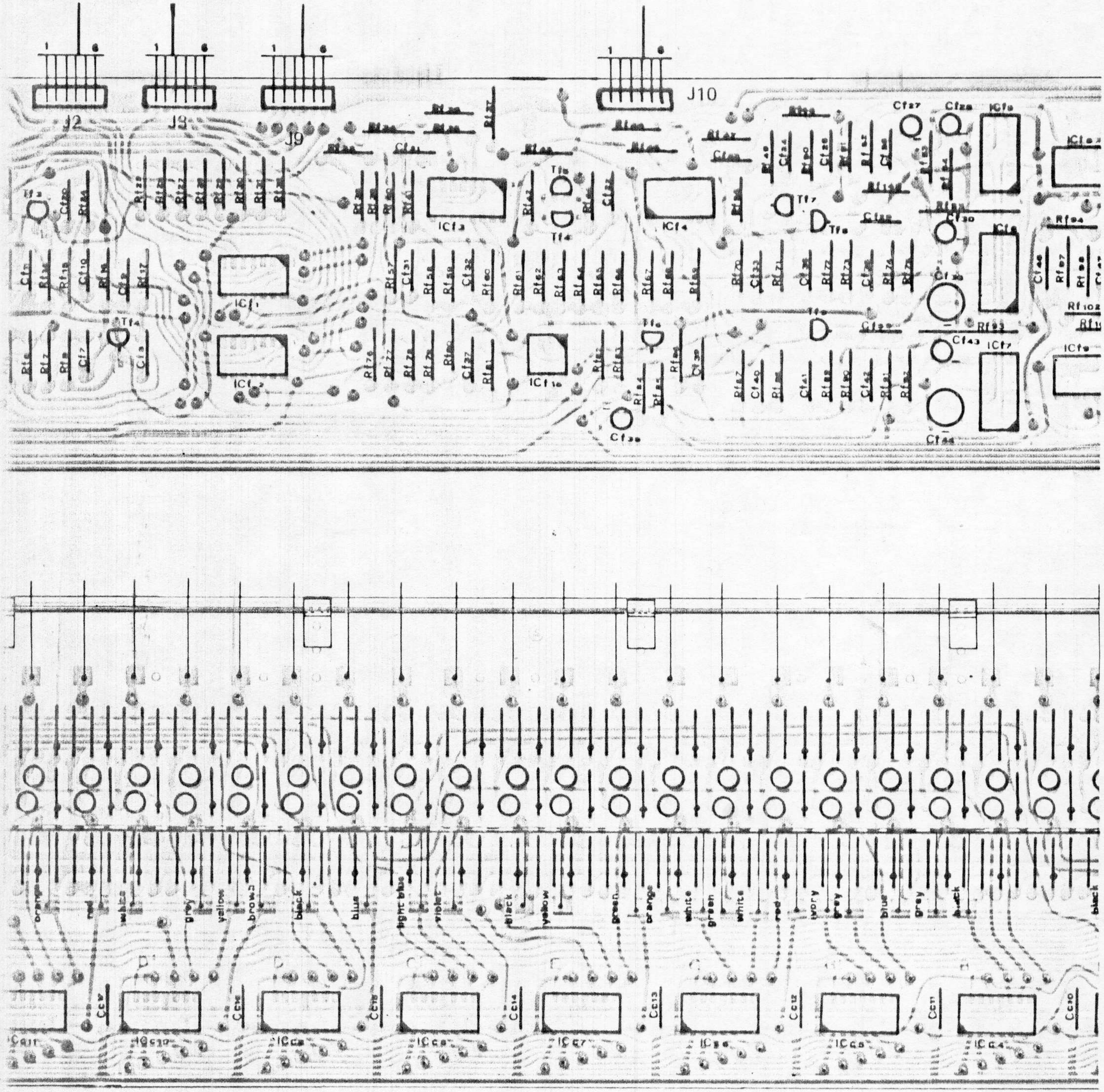
LOGIC,

ENVELOPES

B

ARP INSTRUMENTS, INC.
ASSEMBLY, BOARDS A, C, F & G
QUARTET





J10
J9
ICf1
ICf2
ICf3
ICf4
orange
red
white
grey
yellow
brown
black
blue
light blue
violet
black
yellow
green
orange
white
green
white
red
ivory
grey
blue
grey
black
black

PRESETS SWITCHBOARD (E)

